

Synthetic Turf/Tire Crumb Meeting
August 13, 2008
US EPA, 290 Broadway, New York City, Room 27A

Intro:

On August 13, 2008, a gathering of experts working on synthetic turf and tire crumb issues gathered in NYC at EPA Region 2 offices. This meeting focused on work completed, work underway and future planned studies in the tri state area of NY, NJ and CT.

The goals were to have technical discussions with those conducting or soon to be conducting field tests, allow networking opportunities of technical professionals and identify contaminants of concern. The notes do not reflect policy or consensus from any agency, but instead are a summary of discussions from various experts.

Identifying contaminants of concern was completed by having participants fill in a matrix with contaminants that should be tested as well as noting which agencies were, in fact, testing for these contaminants. By doing this, data gaps were able to be identified. Special thanks are extended to our facilitators (Elissa Tonkin, Joe Siegel and Jeri Weiss), the planning committee (Mark Maddaloni, Maureen O'Neill, Marie O'Shea, Leah Graziano, Ross Highsmith, Michael Firestone and Dennis Santella), and most of all, to the participants who are listed on page 14.

The meeting notes are broken into six parts:

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1. Contaminants of Concern

This begins on the next page. Attached is the table from the meeting with some notes regarding the level of interest in particular contaminants/exposure pathways and the level of effort presently being planned to address such concerns. Please see the notes following the table for a fuller discussion.

Key

ING = Incidental ingestion exposure pathway

*INH = Inhalation (vapor and/or particulate bound) exposure pathway

DER = Dermal (direct contact) and/or percutaneous exposure pathway

ECO = Ecological impacts resulting from run-off or leaching

* Inhalation of particulate-bound contaminants may result in portal-of-entry effects (e.g., pulmonary irritation/inflammation) or be absorbed into the systemic circulation either directly in the alveolar region of the lung (generally for particles < 2.5 um aerodynamic diameter) or through expectoration and subsequent swallowing (generally particles > 2.5 um aerodynamic diameter). Consequently, inhalation exposure studies may need to fractionate PM2.5 and PM10 particles sizes in order to characterize the potential for both pulmonary and gastrointestinal absorption of particle-bound contaminants.

SYNTHETIC FIELD RELATED CHEMICALS								
PRIORITY VOTES FOR COCs				COCS	PLANNED AGENCY STUDY			
ING	INH	DER	ECO		ING	INH	DER	ECO
10	10	1	1	LEAD	NJDEP EPA HUD	NJDEP NYCDOH	NJDEP?	NYSDEC
10	10	4	1	CHROMIUM	NJDEP EPA HUD	NJDEP NYCDOH	NJDEP	NYSDEC
				SVOCs	CTDPH			NYSDEC
				VOCs	CTDPH			
				PM	CTDPH	EPA HUD NYCDOH		
				NYLON				
				POLY-ETHYLENE				
4	5	5	5	BIOCIDES				
1	1			PHTHALATES				
	2			FIBERS				
	3			RESPIRANTS				
INFILL RELATED MATERIAL (METALS)								
				ARSENIC		CTAG		NYSDEC
				BARIUM		EPA HUD		NYSDEC
5	2			CADMIUM		EPA HUD CT NJDEP NYCDOH		NYSDEC
6	4	9	3	CHROMIUM	NJDEP	EPA HUD NJDEP NYCDOH	NJDEP	NYSDEC 3
				COPPER	NJDEP	EPA HUD NJDEP	NJDEP	NYSDEC

NOTES

The table above tallies the results of a survey that was conducted during the synthetic turf/infill technical meeting. The purpose of this survey was to assess what chemicals and exposure pathways were of greatest concern and if collectively the “Agencies” were planning studies directed at these priorities. The numbers on the left side of the table represents the individuals present at the meeting that prioritized a particular chemical and exposure pathway as a concern. The right side of the table represents governmental agencies that are planning studies to characterize potential exposure on a chemical and pathway specific basis. In a perfect world, where there are many large prioritizing numbers for a particular chemical there would be the attendant interest of numerous agencies planning studies. Conversely, where little or no priority has been assigned to a chemical, one would expect little investment in agency resources. The following trends/observations are noted:

- 1) There is considerable interest in lead, both from synthetic turf and infill sources. Accordingly, there are many agencies planning exposure studies. CPSC has already conducted a study investigating the ingestion potential of lead from synthetic turf – yet three more agencies (EPA, HUD and NJDEP) are planning to study lead ingestion associated with synthetic turf. Is the directing of resources commensurate with the level of concern, or, is this overkill?
- 2) Chromium is another metal that has attracted a lot of concern, again both from synthetic turf and infill material. Dermal exposure was noted as a significant exposure pathway but only one agency (NJDEP) is planning to specifically study dermal exposure.
- 3) There was no concern registered re: exposure to particulate matter from synthetic turf but it appears that four agencies (CTDPH, EPA, HUD and NYCDOH) are planning PM exposure studies related to synthetic turf. This may be an artifact of the concern with PM associated with infill material – which everybody seems to be interested in studying.

- 4) There is a lot of concern (ingestion, inhalation, dermal and runoff) over biocides both from synthetic turf and infill material sources but no studies are planned.
- 5) There is some modest concern over non-specific respiratory irritants (nominally associated with the synthetic turf but likely also associated with infill material). Non-specific fibers also registered some respiratory concern. No studies are planned to address this potential exposure component.
- 6) There is a fair amount of concern directed at ingestion of cadmium associated with the infill material. Many agencies are planning to study the cadmium-related infill inhalation pathway but none are planning ingestion studies.
- 7) Major concern was registered regarding the potential ecological impact from infill-related zinc run-off. Only NYSDEC plans to study this issue. No concern was registered relating to dermal contact to zinc, but NJDEP plans to study this potential exposure pathway.
- 8) PAHs (infill related) elicited concern for all three exposure pathways plus ecological effects, however only the inhalation pathway is slated for study.
- 9) Modest concern relating to aniline was registered in infill material but no studies planned.
- 10) There was some concern over latex allergies (dermal) but no studies planned.
- 11) Some concern was registered re: ingestion/inhalation of butadiene and fire retardants, but no studies are planned.

2. Flip Chart Notes from 8/13 Morning and Afternoon Sessions

Potential Next Steps/Research Needs Morning Session

- Liaison with academic institutions - Philadelphia University and University of Las Vegas are doing studies
- Work with ASTM, CPSC and others regarding “no added lead levels”
Understand how/if exposure to lead from artificial turf may elevate lead levels in children
- What lead level from a wipe sample would not contribute to increase in blood lead levels
- How do we mimic aging of fields in the lab setting; protocols are needed
- There should be a long term assessment to identify future/potential issues from weathering
- IEUBK Model Issues
 - Understand the curve used in IEUBK model under 10 ug./dL
 - Alternative to IEUBK model - de minimis increase level of lead
- Lack of outside air measurements above fields and background concentrations of COC (contaminants of concern)
- Develop methods for comb fiber samples
- What may be in the alternative “crumbs”
- Synthesis of alternative materials should be developed with comparison of different materials
- Need to consider users of fields - differences between children playing, recreational use and serious athletes
- Need to consider life-cycle analysis

- What happens to fields at the end of their useful life - recycle or incineration should be considered, other reuses?
- Coordination with CT DPH to fill data gaps regarding detection limits, contaminants of interest

Key Points and Questions Morning Session

- Do not set up issue as a choice between injury and chemical safety
- Is it possible to have an artificial turf field without lead? Is lead chromate necessary for color fixing?
- What are ideal testing conditions for testing; hot/dry or after rain event?
- Should consider environmental pros and cons over the life cycle of sod and synthetic turf alternatives [delete: Should consider the environmental issues of the alternatives to the artificial turf fields.]
 - Sod fields are not pristine. Sod may be grown on biosolids, require intensive water, pesticides, fungicides and fertilizers. No disposal issues at the end of usefulness.
 - Artificial turf uses recycled products/tires, reduces the amount of water, pesticides but there's construction, maintenance, heat island effects. Artificial turf often use herbicides and fungicides. Anti-microbial are used on artificial turf w/ in fill
- Is an IRB needed if conducting testing where activity is taking place on a field?

Afternoon Break-out Session: Sampling and Risk Assessment

- Sampling needs to represent exposure - using personal based monitoring
- Methodological issues:
 - Generating comparable data

- Laboratory methods haven't been validated and are not standardized
 - Do the laboratory methods measure exposure
 - Are the detection limits adequate
- Field staff need to understand what detection limits are needed for risk assessment
- Data gap if only looking at COCs where there's toxicity data - we need to look outside of the street light
- Some of the COCs are found in ambient air and atmospheric deposition - but how much (background levels) change based on urban, suburban, or rural areas
- Need to leverage information that's being gathered by different entities – by using comparable methods data sets from different studies could be combined
- Need to have consensus regarding how data is collected
- Information will be used in risk assessment, but risk assessment is a blunt instrument
- Different perspective for toxicologists and experimental chemists
- Develop Reasonable Exposure Pathways
 - Exposure scenarios aren't straight forward
 - How much surface area will be covered
 - What will be the inhalation rates be?
 - What is the duration of time for exposure
 - Need to have consensus on exposure pathways
 - This should be a done at the federal level
 - These exposure pathways should address regional variations
 - EPA could set up a list serve to discuss these issues
- Variability of chrome rubber - leads to test a number of different fields (not sure what this means?)

- Exotic compounds found in rubber do not have toxicity data or toxicity testing. CT has looked into this.
- Industries' involvement is needed to understand chemical formulation
- Role of Federal Agencies
 - Review of data that is being collected this summer
 - Look at what's being done in the tri-state region and see what should be studied at a national level
 - EPA's workgroup on data interpretation will be looking at exposure scenarios
 - EPA could be doing this more collaboratively with the states
 - Mimic aspects of networks by agricultural laboratories who use logical, standardized protocols
- Leverage what's happening on the west coast; Seattle and San Francisco are also studying this issue
- Sampling considerations
 - Acute vs. chronic sampling needs to be considered 8 hour vs. grab samples
 - Temporal and seasonal variability
 - Screening worse case or average exposure
 - Wipe vs. vacuum sampling - solid surface best for wipe samples porous surfaces
 - Concentration vs. quantity/area (loading)
- Risk assessment uses loading
 - how much can be taken up by dermal exposure and/or ingestion
 - Concentration can be misleading because you could have high concentration but low exposure
- Distinction between school fields, public fields (also day care centers and more!) Fields are used through out the year. Fields are used during the summer
- Dialogue between analytical chemists to identify published protocols and samples collection/analysis

- Risk assessors agree on exposure scenarios and can back calculate the appropriate detection level
- EPA uses HUD wipe methodology because its standardized, vacuuming hasn't been characterized for synthetic fields.
- Will chromium be associated with the lead? Do we need speciation of chrome?
Can we measure chrome to the low nanogram level?
- EPA plans to measure ambient levels
- Biocides
 - Are they being used?
 - It's been hard to get data on information about their use.
 - People may not be truthful

Afternoon Wrap-up of Key Points and Questions

- Importance of chrome - inhalation carcinogen and contact dermal allergen
- More information is needed about EPDM (virgin rubber used for roofing material). Is there any potential for chrome?
- How do we keep the dialogue moving forward?
 - Should the group reconvene after field work is conducted?
 - Set up a list-serve or use email and more informal network
 - Separate groups for risk assessors and analytical issues?
- Contact industry
 - Find out what's being done and distribute information to others
 - Include turf and tire industry
 - How are they addressing the heat problem
 - Do they have information on toxicity testing
 - Can we instructively engage the industry
- Assess sustainability issues regarding artificial turf

- Do we need broad spectrum lab studies?
- How does lab analysis inform field work? Example: photochemical, degradation (road chemicals on tires) aging studies.
- Are we in error because of need for input from rubber, tire and recycling industry? (see NYC review)
- Need to do bulk material analysis.
- What is the backing and adhesive materials made of? What environmental (toxicity and exposure) concerns are there from the backing material and adhesive? Exposure is primarily from runoff issues
- Does CPSC plan to study additional metals and contaminants?
- Need to characterize the alternative materials available for in-fill such as EPDM, synthetic coated sand

3. Notes from Heat Stress and Health Issues Breakout Session

There is consensus about and documentation to support the adverse health effects of heat stress on children. This information does not appear to be widely utilized by the lay public. See Climatic Heat Stress and the Exercising Child and Adolescent, from the American Academy of Pediatrics

<http://aappolicy.aappublications.org/cgi/reprint/pediatrics;106/1/158.pdf>).

An accepted methodology for measuring artificial turf temperature at relevant heights (e.g., three or four feet for younger children as well as surface) is necessary. Expensive instrumentation exists (e.g., wet bulb thermometer) but is not practical for widespread use. A more practical approach would be to correlate available meteorological data in order to prevent heat related illnesses. Model needs to include humidity, solar radiation wind direction and acclimatization (i.e., warmer areas of the US are more tolerant to heat than northern).

While surface burns and abrasions are expected, subsequent infection appears to be more of a result of poor hygiene than from high temperatures on the turf. Extremely high temperatures appear to eliminate infectious agents.

Mitigating factors for turf include:

- Placement of fields
- Shading
- Using watering stations
- Reducing the risk for heated related illnesses
- Watering surface retention
- Performance- color, composition of materials

4. Notes from the Water Breakout Session

The main issues discussed were the difficulties encountered with obtaining stormwater samples from synthetic turf fields. Some of the problems encountered included the following:

- locating and gaining access to on-site drainage systems
- reconciling differences between drainage plans and what is actually encountered in the field
- determining the amount of rainfall needed that will actually result in runoff (given the 6" gravel bed underlying most fields)
- capturing runoff (in particular the "first flush") without the benefit of automatic sampling equipment
- differentiating between turf-runoff and track-runoff, when both are typically captured in drainage systems.

To address some of these concerns, possibilities were discussed of doing bench-scale tests of the various turf/crumb materials, either as a precursor to, or instead of, their proposed field sampling. These bench scale tests can be accomplished using real stormwater and small samples of new or old field materials. Findings from these controlled experiments can be scaled up to estimate pollutant loads from the various crumb materials now in place or recently introduced to the market. Existing studies of this type have been done by EPA ORD and others (Robert Pitt of U of Alabama, Shirley Clark of U of Pennsylvania) to evaluate the pollutant capture of porous pavement, and the pollutant load in runoff from roofing and other construction and paving materials.

Knowing the environmental impact of the new materials currently on the market and being evaluated for future use would help inform not only future material selections, but also contract specifications.

5. Meeting Evaluation

What worked	What you would change
Flexible regarding topics/breakouts	Open it up to greater geographic area
Starting regionally good approach	Healthy snacks

Region can be a test case

Facilitation improved meeting extremely helpful

Presentations and meeting kept on time

Number of people, topics, worked well

Can tell lots of planning and effort went into meeting

Advantage of knowing one another conversation can now communicate by email or other ways

6. Meeting Attendees

Last Name	First Name	Agency	Title	Email
Azarias	Andriana	NYC DOHMH	City Research Scientist	aazarias@health.nyc.gov
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7. Meeting Agenda

Synthetic Turf/Tire Crumb Meeting Agenda
August 13, 2008
US EPA, 290 Broadway, New York City, Room 27A

MORNING DISCUSSIONS: WHERE WE'VE BEEN and NEAR FUTURE ACTIVITIES PLANNED OR UNDERWAY**

9:30 Welcome (Maureen O'Neill, US EPA)

9:45-10:30 WHAT'S DONE?

Glenn Pullinam-NJDHSS, Mary Jean Brown-CDC, Kris Hatlelid-CPSC

10:30 - 11:35 WHAT'S PLANNED?

Ly Lim-NYSDEC, Nancy Clark-NYCDOHMH, Ross Highsmith-USEPA,
Alan Stern-NJ DEP, Brian Toal-CT DEP

RESPONSE

Mark Maddaloni-US EPA, Liam Kavanaugh-NYC Parks,
Following Mark and Liam's comments, we will open to the group

Lunch 12 – 1 (On your own – map showing close delis will be available. Pick up lunch and return)

AFTERNOON DISCUSSIONS: WHERE DO WE GO FROM HERE?

Session I: Contaminants of Concern 1:00 – 2:30

Exploring priorities; identifying information gaps.

Session II. Concurrent discussion groups : 2:30 – 3:30

Group 1 - Sampling/Lab and Data Interpretation

Group 2 - Heat Stress

Group 3 - Water Runoff

Wrap-up/Next Steps : 3:30

Adjourn : 4:00

**The meeting will be facilitated by Joe Siegel of our NY office and Ellie Tonkin and Jeri Weiss from our Boston office.

8. Power points for distribution were submitted by NJ DHHS, CDC, EPA and NYS DEC. They are not attached due to large file size but can be obtained upon request.